ABSTRACTS (MASTER THESIS)

Clarification of NO_2 sorption behavior and Assessment of air quality in warehouse of cedar timber

(Graduate School of Agriculture, Laboratory of Sustainable materials, RISH, Kyoto University)

Miyuki Nakagawa

Introduction

In recent years Japanese cedar (*Cyptomeria japonica*) wood showed high NO_2 sorption ability compared with other wood species. The cross-sectional surface of tracheid, the extractives and the moisture of wood were the factors affecting the sorption performance of NO_2. However, the influences of these factors are not evaluated in detail. Japanese cedar timber also showed high humidity control function in end grain. As a material the flat-sawan Japanese cedar timber slitted across the end grain is developer. However, there were few evaluation studies in actual space. This research discusses the characterization of the NO_2 sorption behavior with various sample configurations and drying methods and the humidity-control function of Japanese cedar.

Methods

[1]NO_2 sorption behavior: In an incubator at 20˚C, samples of Japanese cedar with various configurations and drying method were aerated with an air under the NO_2 concentration of 1000ppb (low velocity: 560ml/min). NO_2 concentration before and after passing through the samples was monitored with a NOx analyzer for 24hrs. The amount of NO_2 sorption was calculated and compared among various samples.

[2]Humidity control function: In indoor warehouse cedar slitted panels were set, and the change of temperature and relative humidity, aldehyde concentration and metal corrosion were measured for a year.

Results and discussion

[1] Fig.1 shows the amount of NO_2 sorption of 1.5mm-thick discoidal and 15mm-thick plated specimens of cross-section where the gas flows through/over the tracheid, respectively. The former absorbed the NO_2 much more than the latter. This indicated that the effect of NO_2 sorption depends on available inner surface area of contact. NO_2 sorption ratio of the specimens decreased with the increase of drying temperature due to the amount of extractives in the specimen, thus the amount of NO_2 sorption is affected by the extractives of the specimens.

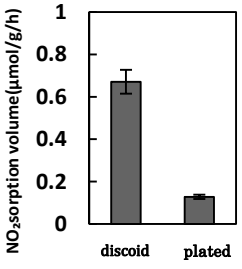

Fig1. NO_2 sorption volume of different gas contact condition

[2] The relationship between the amount of cedar slitted panels and humidity change ratio in air volume at indoor warehouse described a high correlation. It means that the cedar slitted panels have a high humidity control function in actual space.